

The Canadian Entomologist.

VOL. XLVIII. LONDON, DECEMBER, 1916

No. 12

POPULAR AND PRACTICAL ENTOMOLOGY.

THE PLUM CURCULIO IN ONTARIO, NATURE AND EXTENT OF THE INJURIES, CONDITIONS FAVORING THE INSECT, AND MEANS OF CONTROL.

PART I—NATURE OF THE INJURIES.

BY L. CAESAR, GUELPH.

The Plum Curculio is found practically all over the fruit-growing portions of Ontario, and is one of our most destructive and, under some circumstances, difficult insects to control. The name "Plum Curculio" is misleading because the insect attacks not only plums but apples, pears, cherries, peaches, apricots, quinces and, on rare occasions, gooseberries. In our experience apricots are worst attacked, then plums and sweet cherries; after these sour cherries, apples, pears, peaches and quinces in the order named. We have only in one locality seen gooseberries attacked.

Kinds of Injuries.—There are several kinds of injuries: First, there is the injury due to egg laying and the accompanying crescent-shaped scar made by the female almost immediately after the act. There may be anywhere from one to a dozen or more eggs, each with its crescent, to a single fruit. If such fruit does not drop prematurely, it is usually either disfigured by the enlargement of the crescent into a brown scar or calloused area, which by its nearly semi-circular shape still shows its origin, or is deformed by a depression caused by the growth being checked at the point of oviposition but being continued all around it. There may be several of these depressed areas, some of them quite deep, on a single fruit. This type of deformity is very common on apples and pears but much more rare on other fruits. Some of the apples and pears are so much misshapen that they are totally unfit for market. Such fruit is often spoken of as being "knobby." The pear has the habit of producing stone cells at the injured places.

These spots become so hard and gritty that they are likely to break one's teeth if an attempt is made to bite through them.

The second injury is caused by the early feeding habits of the first generation of beetles, that is the over-wintered beetles. Both males and females during the egg-laying season feed upon the fruit, eating out little holes of about 1-24th of an inch or a little more in diameter. In our observations these feeding punctures were not nearly so numerous as the crescent-shaped cuts, but several investigators have found them quite as numerous. These punctures, too, seem to lead to the same kind of deformities in apples and pears as we have described above.

The third injury is the dropping of most of the infested fruit. If the larva, or grub, that hatches from the egg lives, practically all kinds of fruit except cherries drop prematurely. Fortunately not only does a very large percentage of the eggs fail to hatch, but also a great many of the larvæ themselves die in the fruit soon after hatching, so that these two things lessen the total amount of dropping. Premature falling of fruit extends over a period of more than a month, but most of it takes place before the apples are more than about one inch in diameter. On some trees sprayed for Codling Moth we found over 90% of all the early drops were due to the Curculio. When the fallen fruit was cut through, it was seen that the grubs by the time they were mature had eaten large areas inside, as large and as unsightly in many cases as those caused by the Codling Moth larvæ. The infested cherries, which, as has been said, remain on the trees, usually become sunken and darkened on one side, thereby clearly revealing the work of the insect. Cherries containing the Cherry Fruit-fly larvæ do not always have some outward manifestation of the presence of an insect.

A fourth injury is caused by the late summer and autumn feeding of the new generation of beetles. This injury is common on apples and peaches, but rare on other fruits. On the apple the beetle eats a small, round hole through the skin, and then inserts its long proboscis and excavates the flesh as far as it can reach. The result is a small, circular, brown area on the surface with a hole in the centre and a cavity beneath. Sometimes the beetles work

their way through the skin and enlarge the cavity until it is nearly quarter of an inch in depth and about the same in breadth. Not infrequently, if this hole is on the sunny side of the apple, its borders for some distance out will be reddened by the sun and thus the injury rendered very conspicuous. Many fruit-growers mistake such injuries for the side work of the Codling Moth, but the distinction between the two is easy to make, because the Codling Moth goes right into the core, while this injury is seldom more than quarter of an inch deep. There are often many of these injuries in a single fruit; for instance, I have counted as many as forty on one apple. In such cases several injuries usually coalesce and make a much disfigured fruit. In the writer's experience, rough-skinned varieties seem to be more subject to attack than very smooth or glossy ones, possibly because the former afford a firmer foothold for the beetles when feeding.

Peaches are also sometimes quite severely marred by this fall feeding. A peach that lies on my desk as I write has eighty curculioscars on it, all made by the new generation of beetles during August and September. From half of these, including all the larger and deeper ones, gum is exuding. The appearance of the injuries on the peach and apple differs in that on the peach the beetles usually remove all of the skin above the cavity which they excavate; the injured area, too, is often quite irregular in outline, and seldom goes so deep as in the apple. In the apples the skin, as we have stated, usually covers the excavation except for the small hole in the centre where the beak is inserted, and the injured area is usually uniformly circular in outline.

A fifth injury is brought about by the wounds made by the beetles, both in the earlier and later parts of the season, in plums, cherries and peaches affording exposed areas for the introduction of the spores of the Brown Rot disease. The skin of fruits ordinarily serves to a very great extent as a protection against the introduction of disease, but, if the skin be ruptured, the spores, which are carried by the wind everywhere through the orchard, have a good chance to light on the moist surface and germinate before a callous can be formed by the fruit over the wound to protect it.

EXPLANATION OF PLATE XI.

- Fig. 1. a. a. a. Small lumps of earth showing the pupæ in their little oval chambers; b. a dark circular area in the lump showing the empty chamber after the pupa has been removed; c. an adult beetle after transforming and still in the pupal chamber; d. d. d. adult beetles—all natural size.
- Fig. 2.—Apple showing the crescent-shaped cuts made by the females after laying eggs—natural size.
- Fig. 3.—Full grown larvæ and their work in a fallen apple—natural size.
- Fig. 4.—Fall or late summer injuries on apple made by the feeding of the new generation of beetles. These injuries though natural size are larger than the average.
- Fig. 5.—Fall or late summer injuries made on peach by the feeding of the new generation of beetles—natural size.
- (To be continued.)

NEW INDIAN GALL MIDGES.

BY E. P. FELT, ALBANY, N. Y.

Below are characterized some exceptionally interesting new species and genera occurring in a small collection recently submitted for study by Prof. T. Bainbrigge Fletcher, Imperial Entomologist, Agricultural Research Institute, Pusa, Bihar, India.

***Colpodia fletcheri*, n. sp.**

The midge described below is provisionally referred to this genus because the sum total of the characters would suggest this group rather than another, though the cross-vein is almost parallel with costa, and there is an approach to a condition found in the genus *Didactylomyia* Felt. The specimen was labeled "Pusa, Bihar, India, U. Bahadur, January 1, 1916." It is easily distinguished by the peculiar, foliate, curved production of the terminal clasp segment and the tri-lobed, foliate apex of the harpes.

Male.—Length 1.25 mm. Antennæ one-half longer than the
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body, rather thickly haired; 15 segments, the fifth with a whitish transparent stem twice the length of the blackish subcylindric basal enlargement, the latter with a well marked, low circumfilum at the basal third and a moderately thick subapical whorl with long, stout setæ; terminal segment slightly produced, with a length a little over twice its diameter, the apex broadly and irregularly rounded. Palpi: first segment irregular, quadrate, the second a little longer, the third twice the length of the second, more slender, and the fourth a little longer than the third. Mesonotum fuscous yellowish. Scutellum reddish yellow, postscutellum reddish. Abdomen rather thickly haired, reddish brown. Wings long, slender as in *Colpodia*, the cross-vein nearly parallel with costa, the fifth vein uniting with the posterior margin at the distal third, its branch at the basal third; halteres yellowish transparent. Coxæ fuscous yellowish. Legs mostly dark straw, the three distal tarsal segments of the hind legs yellowish white; claws moderately long, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia; basal clasp segment short, very broad, quadrate, with an irregular, fingerlike, heavily chitinated process at the internal distal angle; terminal clasp segment broad at base, tapering and curving irregularly to a slender, curved, somewhat foliate apex; dorsal and ventral plates indistinct. Harpes greatly produced, heavily chitinated, the distal free half tapering slightly to an irregularly expanded, tri-lobed, foliate appendage. Type *Cecid.* 1696.

***Harpomyia*, n. gen.**

This genus was erected for a species belonging in the *Dasyneura* series having 12 antennal segments and may be most easily recognized by the greatly produced, somewhat sickle-shaped harpes of the male. These organs have a length greater than the entire hypopygium and extend posteriorly like a pair of scissor blades. Type *H. indica*, n. sp.

***Harpomyia indica*, n. sp.**

The midges described below were labeled as having been reared from larvæ found under the lining of a felt cap, August 19, 1915, U. Bahadur.

Male.—Length 1 mm. Antennæ nearly as long as the body, thickly haired, yellowish brown; 12 segments, the fifth with a stem

one-half the length of the subcylindric basal enlargement, which latter has a length about three-fourths greater than its diameter, sub-basal and apical circumfili and subapically a moderately thick whorl of long, moderately stout setæ; terminal segment slightly produced, narrowly conical, with a length about three times its diameter. Palpi: first segment short, subquadrate, the second with a length three times its width, moderately broad, the third one-half longer than the second, more slender, and the fourth one-half longer than the third, more slender, the distal three sparsely haired. Eyes large, holoptic. Mesonotum pale yellowish brown, the submedian lines bright yellowish. Scutellum dark brown, postscutellum yellowish brown. Abdomen yellowish transparent, the genitalia relatively very large and subdorsal. Wings hyaline, subcosta uniting with the narrowly scaled costa near the basal third, the third vein a little before the apex; the fifth vein, indistinct distally, unites with the posterior margin near the distal third, its branch near the basal half; halteres whitish transparent. Coxæ, femora, tibiæ and the two basal tarsal segments mostly whitish or whitish transparent, the three distal tarsal segments dark brown; claws long, slender, moderately curved, unidentate, the pulvilli about three-fourths the length of the claws. Genitalia: basal clasp segment short, stout, curved, the sides nearly parallel, the apex roundly emarginate, the distal angles produced, the internal being longer and broader; dorsal and ventral plates indistinct, the harpes produced as two long, slender, chitinized, somewhat sickle-shaped pieces having a length greater than the entire hypopygium and extending posteriorly somewhat like a pair of scissors.

Female.—Length 1 mm. Antennæ extending to the base of the abdomen, rather thickly haired, yellowish brown; probably 12 segments, the fifth subsessile, broadly subconical, with a length about one-half greater than its diameter; low circumfili at the basal third and apically, a sparse basal and a scattering subapical whorl of long setæ; terminal segment reduced, broadly conical and tapering to a broadly rounded apex. Palpi: first segment with a length three times its diameter, the second a little longer, broader, the third twice the length of the second, more slender and the fourth one-fourth longer than the third, all sparsely haired. Eyes holoptic,

purplish brown. Ovipositor short, stout, the terminal lobes narrowly oval, with a length three times the width and sparsely setose. Other characters practically as in the male.

Pupa.—Length .9 mm., moderately stout, probably yellowish, the antennal cases extending nearly to the base of the abdomen, the wing cases to the third abdominal segment, and the posterior leg cases almost to the tip of the abdomen; the thoracic horns long, filamentaceous, the posterior extremity with submedian, conical processes.

Larva.—Length 2 mm., moderately slender; extremities, anterior conical, posterior broadly rounded, the head and breast-bone not recognizable in the preparation.

Egg Shell.—Length .5 mm., narrowly oval, the surface with numerous minute, hexagonal thickenings, the latter with minute spines arising mostly in or near the angles.

The large size of the egg shell suggests that the females of this species, like *Miastor*, produce comparatively few eggs.

***Indodiplosis*, n. gen.**

This genus approaches *Erosomyia* Felt, in the greatly produced and broadly rounded posterior area of the wings, and is readily distinguished therefrom by all of the claws being unidentate, a feature unique so far as known to us, among the sub-tribe bifili. Type *I. mangiferae*, n. sp.

***Indodiplosis mangiferae*, n. sp.**

Gall midges were labeled "March 23, 1914, in galls of Mango leaf. Pusa, A. H. C., No. 1023." A female, presumably conspecific, was received from the same source and labeled "C. No. 100, Mango leaves, Pusa, Bihar, T. Ram, September 26, 1915." These dates would indicate the possibility of there being two generations annually, though the appearance of the female may have been erratic and induced by abnormal conditions.

Male.—Length .75 mm. Antennæ nearly twice the length of the body, thickly haired, light brown; 14 segments, the fifth with the stems equal and one-fourth greater than their diameters respectively; basal enlargement subhemispheric, the distal enlargement subglobose, each with a sparse whorl of long, stout setæ and moderate circumfili, the loops, about eight in number, being

moderately stout and extending nearly to the base of the next enlargement. Palpi: the first segment slender, irregular, second narrowly oval, with a length about twice its diameter, the third a little longer and more slender than the second, the fourth one-half longer than the third, more slender. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen rather thickly haired, brownish yellow, the genitalia darker. Wings hyaline, subcosta uniting with the margin near the basal third, and with the inclosed cell clouded with a chitinous thickening, the third vein nearly straight, joining the margin at the apex of the wing, the fifth indistinct distally, uniting with the posterior margin at the distal third, its branch at the basal third; halteres pale yellowish. Legs mostly dark straw; claws long, slender, unidentate, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment long, slender, with a rather distinct internal, quadrate lobe basally; terminal clasp segment somewhat swollen at the base, irregular and tapering to an obtuse, spurred apex; dorsal plate short, broad, broadly and triangularly emarginate, the lobes narrowly rounded and sparsely setose; ventral plate moderately long, broad, deeply and narrowly and triangularly emarginate, the lobes rather broad and tapering slightly to a narrowly rounded, setose apex; style long, stout, narrowly rounded apically. Type Cecid. 1686.

Exuvium.—Length 1.5 mm., moderately stout, whitish transparent, the antennal cases with indistinct basal processes internally and extending to the second thoracic segment, the wing cases to the fourth abdominal segment, and the leg cases to the fifth abdominal segment, respectively; the dorsum of the abdominal segment rather thickly and uniformly covered with minute, chitinous forks; posterior extremity broadly rounded, somewhat lobed and incised apically.

Female.—Length 2 mm. Antennæ extending to the third abdominal segment, sparsely haired, dark reddish brown; 14 sessile segments, the fifth with a length one-half greater than its diameter, subcylindric, with a rather thick basal whorl of stout setæ, a scattering subapical whorl of more slender setæ and at the basal third and apically, low, unusually broad circumfili, the distal filum with the loops somewhat elevated and reaching nearly to the base of the following segment; terminal segment somewhat produced and

tapering to an irregular, narrowly rounded apex. Mesonotum dark brown. Scutellum reddish brown, postscutellum yellowish. Abdomen mostly dark red, the wings subhyaline and the wing venation practically as in the above described male and with the costal cell decidedly more obscured; halteres yellowish basally, brownish apically. Coxæ and legs mostly brownish straw. Ovipositor short, up-turned, the terminal lobes subquadrate, with a length one-fourth greater than the width and bearing a few long, slender setæ and numerous shorter ones. Other characters practically as in the above described male. Cecid. 1695.

This sex is provisionally associated with the preceding.

Streptodiplosis, n. gen.

A remarkable male referred to this genus suggests, in the somewhat broad wings, an affinity with *Lobopteromyia* Felt, from which it is easily separated by the very peculiar genitalia. Type *S. indica*.

Streptodiplosis indica, n. sp.

The one male described below was labeled "number 38, Kusti, Kalan Estate, North Wynaad, South India, February 16, on leaves infested by *Mytilaspis piperis* Green. U. Bahadur." It is probably predaceous upon this scale insect.

Male.—Length .75 mm. Antennæ twice the length of the body, rather thickly haired, pale grayish, the stems whitish transparent; 14 segments, the fifth having stems with a length two and one-half and three and one-half times their diameters, respectively; basal enlargement globose, with a sub-basal whorl of long, stout setæ and a subapical circumfilum, the moderately stout loops extending nearly to the globose distal enlargement, which latter bears similar setæ and loops; terminal segment having the basal enlargement oblate, a stem with a length about three times its diameter and the distal enlargement prolonged, with a length over twice its diameter and tapering at the distal third to an obliquely rounded apex. Palpi apparently quadri-articulate, the first segment small, subquadrate, the second with a length over twice its diameter, the third one-half longer, more slender, and the fourth one-half longer and more slender than the third. Face white. Mesonotum, scutellum, postscutellum and abdomen

yellowish white, the abdomen basally and laterally with an irregular, black marking, possibly due to the body contents. Wings hyaline, broad, with a length hardly twice the width, subcosta uniting with the anterior margin at the basal third, the third vein with its distal fourth curved posteriorly, a little before the apex of the wing, and the fifth vein joining the posterior margins at the distal fourth, its branch at the basal half; the forks of the fifth vein subobsolete and indistinct; halteres whitish transparent. Coxæ pale yellowish; legs mostly a very pale straw; the small claws with a length about half the diameter of the distal tarsal segment, simple, the pulvilli about as long as the claws. Genitalia large, extremely complex, greatly twisted; basal clasp segment long, irregular, swollen basally, slender apically; terminal clasp segment subapical, slender, irregular, the distal third somewhat expanded and thickly and finely setose; dorsal plate long, deeply and triangularly emarginate, the lobes slender, sparsely haired and extending nearly to the apex of the genitalia; ventral plate not recognized, the harpes strongly chitinated, convolute, irregularly S-shaped. Type *Cecid.* 1693.

SOME BEES FROM MADAGASCAR.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The following bees were received from the Queensland Museum; I do not know who collected them.

***Pachymelus microlephas* Smith.**

Miarinarivo, (Queensl. Mus. 9).—*P. sorar* Mocsary is evidently a synonym.

***Pachymelus grandidieri* n. sp.**

♀.—Length 23.5 mm., anterior wing 18; robust, black, with black, fulvous and pale ochraceous hair; tegument of clypeus (which is polished and sparsely punctured, not gibbous in middle), labrum, and greater part of basal half of mandibles orange; mandibles bidentate, and with a subapical fulvous patch; eyes large, brownish red; facial quadrangle longer than broad; scape short, red, with a broad, yellow stripe in front; flagellum ferruginous, becoming chestnut above, third antennal joint very nearly as long as the

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next four combined; hair of head entirely fulvous, very bright and abundant on occiput; prothorax with dark seal-brown hair; mesothorax densely punctured, covered with short, black hair, which imperceptibly shades into dark brown anteriorly, the extreme hind margin with a little ochraceous hair; scutellum and metathorax covered with ochraceous hair, fulvous laterally; scutellum dark reddish, bigibbous in middle, the bosses rounded and polished, free from hair; pleura with black hair, except anteriorly below, where it is long and fulvous; tegulae large and black; wings fuliginous, paler and yellower basally; first r. n. meeting second t. c; b. n. falling far short of t. m.; legs dark red, with rich, fulvous hair; abdomen dullish, with very minute punctures and scattered larger ones; surface appearing black and nearly nude (though with appressed black hair on third segment) as far as middle of fourth segment, but beyond that the abdomen is covered with long, fulvous hair; venter dark reddish, the segments fringed with fulvous hair.

Miarinarivo, (Queensl. Mus. 17). A beautiful species, nearest to *P. heydenii* Sauss., but differing by the lack of fulvous hair on first abdominal segment. It is also appreciably smaller, although it is a female and *heydenii* was described from a male. It is named after the author of the great work on Madagascar, in which Saussure described several species of the same genus.

***Crocisa subcontinua* Saussure.**

Miarinarivo, (Queensl. Mus. 49).—I have also a specimen collected in Madagascar by Hildebrandt.

***Anthophora antimena* Saussure.**

Miarinarivo, (Queensl. Mus. 47).—The specimen, a female, is so grey in tone as to appear almost greenish, and the wings are dusky. Possibly it represents a distinct race, but more material is desirable.

***Megachile piliceps* Saussure.**

Miarinarivo, (Queensl. Mus. 51).—This* species (male) is superficially almost exactly like *M. perbrevis* Cress., from Texas.

THE NORTH AMERICAN SPECIES OF *DIBRACHYS* (IN THE NORTH AMERICAN SENSE—*CÆLOPISTHOIDEA* GAHAN) WITH A NOTE ON *URIELLA* ASHMEAD.

BY A. A. GIRAULT, GLENNDALE, MD.

The genus *Dibrachys*.

Antennæ inserted a little above the ventral ends of the eyes but distinctly below the middle of the face. Mandibles 4-dentate. Pedicel longer than funicle 1. Propodeum with little or no neck. Abdomen conic-ovate, pointed. Postmarginal and stigmal veins subequal, short. Segment 2 of abdomen largest, not long.

Propodeum tricarinate. Clypeus somewhat produced, somewhat sinuate at apex, striate.

Spiracular sulcus absent.

Coxæ and femora and the antennæ except the scape, concolorous; funicle joints very short, all wider than long, 1 smallest; second ring-joint twice the size of the first. Postmarginal vein slightly shorter than the stigmal.....*apatelæ* Ashmead.
(=*pimplæ* Ashmead.)

Coxæ and the flagellum except much of the pedicel, concolorous; funicle 1 quadrate or somewhat longer than wide, longest, the ring-joints very unequal. Postmarginal vein usually slightly longer than the stigmal; propodeal spiracle reniform. Segment 2 of abdomen only slightly notched at meson caudad as in *apatelæ*. Male antennæ entirely yellow, (compare *boucheanus* Ratzeburg).....*clisiocampæ* Fitch.
(=*nigrocyanus* Norton; =*chionobæ* Howard; =*nematicida* Packard; =*gelechiæ* Webster.)

The same but male flagellum

black.....*cladiæ* Gahan.

The species *apatelæ* and *pimplæ* were described as *Arthrolytus*; *clisiocampæ* Fitch as *Semiotellus*; *nigrocyanus* Norton as *Cleonymus*; *nematicida*, *chionobæ* and *gelechiæ* as *Pteromalus*; and *cladiæ* as *Cælopisthoidæa*.

Uriella rufipes Ashmead. (Genotype)

Antennæ inserted below the middle of the face but somewhat
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above the ventral ends of the eyes, 13-jointed with two ring-joints, the club normal, the pedicel subequal to funicle 1, twice longer than wide at apex. Genal suture distinct. Clypeus sinuate, at the meson with a distinct, sharp tooth; clypeus subglabrous, nonstriate. Caudal tibial spurs distinct, *double*. Venation as in *Pteromalus* but the marginal vein is thickened a little at base. Mandibles 3- and 4-dentate. Otherwise as in *Habrocytus rhodobæni* Ashmead, but the median carina of the propodeum is absent (the lateral distinct), and the spiracular sulcus is only somewhat indicated by a hollow (no true sulcus). Has nothing to do with *Homoporus* or *Phanacra*, and is a miscogasterid of the present Metastenini.

THE OCCURRENCE OF *NEODEROSTENUS* GIRAULT IN NORTH AMERICA (HYMENOPTERA).

BY A. A. GIRAULT, GLENNDALÉ, MD.

A species from the woods, June 4, 1916. The abdominal petiole in this American species is transverse-linear.

***Neoderostenus bipunctatus*, new species.**

Female.—Length 0.95 mm.

Brassy metallic green, the wings hyaline, the venation dark, the legs and scape (except the middle and caudal coxæ except at extreme apex), white. Head and thorax densely scaly, the scutum scaly-punctate, the scutellum with a compound, 3-foveate puncture at middle between meson and lateral margin (and sometimes with another puncture caudo-mesad of the first), somewhat as in the Australian *Achrysocharoides sarcophagus* Girault. Parapsidal furrows at cephalic sixth mere sutures, thence subglabrous, rather broad grooves. Propodeal spiracle minute, round, cephalad (but over its own diameter from the cephalic margin). Propodeum subglabrous. Postmarginal vein no longer than the short stigmal, the marginal fringes of the fore wing very short. Funicle joints subequal, each about twice longer than wide, a third longer than the pedicel which is a little longer than club 1; terminal spine of club distinct. Mandibles 5-dentate, the two outer teeth large, subequal, the inner three subequal, minute.

One female by sweeping, Glenndale, Maryland.

Type.—Catalogue No. 20314, U. S. N. M., the female on a tag, the head on a slide.

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A NEW GENUS OF OMPHALINE EULAPHID CHALCID-FLIES FROM MARYLAND.

BY A. A. GIRAULT, GLENNDALE, MD.

Euderomphale, new genus.

Female.—Form of *Chrysocharies*. Head (cephalic aspect) rounded. Antennae inserted at the clypeus, clavate, 8-jointed, with two large ring-joints and one funicle, the pedicel longer than the funicle and ring-joints combined. Parapsidal furrows complete, much curved, the parapsides ovate. Scutellum simple, much wider than long, short-hemispherical. Propodeum short, noncarinate, the spiracle minute, round, cephalad. Marginal vein subequal to the submarginal, the postmarginal absent, the stigmal rather long, linear. Marginal fringes of the fore wing moderate (a fifth of the greatest wing width). Mandibles acutely, equally bidentate.

Euderomphale fuscipennis, new species. (Genotype.)

Female.—Length 0.90 mm.

Metallic purple, the knees very narrowly and the first three tarsal joints white, the cephalic tibiae brownish. Fore wings smoky under the whole of the marginal vein, the distal margin of the infuscation oblique but entire. Venation fuscous; base of fore wing more or less smoky. Caudal wing infuscated like the fore wing, with about eight lines of discal cilia where widest (at apex of the marginal vein). Body reticulate, scaly, shining. Scape long, obclavate, the pedicel over twice longer than wide at apex; ring-joint 2 twice the size of 1; funicle cup-shaped, subquadrate, over twice the size of the ring-joints united; club conic-ovate, and with a distinct terminal spine which is nearly as long as the joint which bears it; club as long as the scape or as the flagellum (funicle plus pedicel and the ring-joints).

One female, Glenndale, Maryland; from a neglected meadow, by sweeping, June 22, 1916.

Type.—Catalogue No. 20349, U. S. N. M., the specimen on a slide.

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THE SHELL-BARK HICKORY MEALY-BUG.

BY A. H. HOLLINGER, UNIVERSITY OF MISSOURI, COLUMBIA, MO.

***Pseudococcus jessica*, sp. nov.**

The writer names this new species of Coccidæ in honour of his wife.

Young Larvæ.—About .5 mm. long when born, and covered with a thin, transparent egg-shell; about .25 mm. wide; oval, broadly rounded at cephalic end and slightly tapering from the fore part of abdominal region to the anal lobes; anal lobes each bearing one short hair; colour: reddish brown on dorsal surface, but orange-brown on the ventral surface, due to the colour of the legs and antennæ; with transmitted light through prepared slides the body appears orange-brown; antennæ six-segmented, bearing numerous hairs; eyes reddish or purplish in colour and situated just behind the peduncles of the antennæ; quite active; body covered with a fine, white, powdery, waxy secretion except at articulation of body segments.

Adult Female.—4 to 6 mm. long; 2 mm. high; 2.5 mm. broad; generally hemispherical in outline, flattened ventrally, and sometimes dorsally when crowded between the bark and wood; colour: purplish blood-red (about the same as that of the woolly aphis—*Schizoneura lanigera*) covered with a relatively thick deposit of white, waxy, secreted powder; no lateral fringe of white waxy exudation, nor any hairs, nor secreted waxy, glassy filaments as in certain other mealy-bugs; segmentation of body delineated by thinner secretion of powder wax at those places of articulation; no ovisac is formed, the embryos being laid at caudal end of body under the parent; legs and antennæ reddish brown; when boiled in 10% KOH the bodies of the adults turn deep blue-black and colour the KOH a blood-red.

The *males* have not been observed.

Locality.—Columbia, Mo.

Habits.—It takes the young about fifteen minutes after birth to free themselves from the thin, membranous egg-shell which envelopes them. They have no powdery secretion when they first emerge from the pellicles. The young larvæ have the habit of congregating in masses when not attended by their common "shepherds," the little black ant (unidentified). In their natural

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habitat, under the shaggy bark of the shell-bark hickory (*Hickoria ovata*), the ants do not allow them to remain any great length of time where they are born, but are transferred by them to the terminal or lateral twigs of hickory shoots at the base of the tree, or are transferred to similar situations on the old tree itself, where the bark is tender, such as occurs at the junctures of the leaf petioles with the twigs or at any abrasion or crevice in the bark, and here they are guarded and attended by a few of the ants which watch with all the dexterity and aggressiveness they possess. Here they remain until fall, feeding on the sap, and are "herded" by the ants when cold weather sets in, probably being taken into their nests where they hibernate, or possibly some few crawl under the bark and into crevices of the older bark where they pass the winter in these locations. In early spring, as soon as warm weather comes to stay, the larvæ are transferred by the ants to the tree, under the hard protecting bark, where they commence feeding and growing. They apparently become full-grown and mature by about the middle of July in this latitude, for adult females were examined on the 12th July and they were full of embryos. The first larvæ were observed on the 28th July, and they continue to lay eggs up to the middle of September (1915) and probably even later.

This is the largest *Pseudococcus* of which the writer knows, and its size and host plant are enough for ready identification. This scale insect is invariably attended by certain common black ants and the Coccidæ are generally in groups of two or three, but sometimes as many as ten are grouped under a slab of bark only six inches in diameter. This gregariousness in habit probably occurs because the ants can collect an abundance of "honey-dew" from the colony without any great difficulty, thus saving time and energy on the part of the ants. As many as fifty ants have been observed encircling one female adult, and as many more were crowding around to get their meal of secreted fluid. When disturbed by the removal of the bark, the ants would run around frantically with the tips of their abdomens elevated and their mandibles extended, making a most formidable appearance. The Coccids are generally located between the bark and wood where

there is just enough room for them to expand to their maximum development, and where the ants have easy access to the food-supply of secreted liquid. The writer has, however, occasionally found an isolated female scale which had been protected from external agents by the ants building up walls of frassy material from the wood of the tree to the shaggy flake of bark which had weathered away from the Coccid, thus exposing it to the attacks of predacious or parasitic insects until such a protection had been built by the ants. Through this wall of protective material were several entries or exits, as the case might be, for the ants to go to their "cows."

Natural Enemies.—While collecting this scale insect, the writer has found several Syrphid spp. larvæ in close conjunction with the sides of the scales, apparently feeding on their bodies. Insects thus attacked were partially shrivelled, but still alive and attended by the ants as usual. In a few cases the Syrphid larvæ were completely covered by the adult scale, probably having wormed their ways beneath the insects. It would appear that the ants tolerate this intruder, but for what reason, the writer cannot definitely say, unless it is because the Syrphid larvæ also give off a sweetened secretion, or because the ants have not learned to distinguish between the scale and the fly larvæ, or because the intruder does not entirely destroy the secreting faculties of this coccid. Most of the Syrphid larvæ are apparently of one species, being salmon pink in colour, and about 3 mm. long and 1 mm. wide at time of observation (14 Aug., 1916). However, a large, flattish circular or slightly elongate creamy-white Syrphid larva, 4 mm. long and 3 mm. wide was also taken in connection with the scales, but none have matured to render identification possible. No parasitic Hymenoptera have been reared from this Coccid.

Remarks.—A smaller, differently coloured mealy-bug, possibly very close to this species is mentioned from the same host in Indiana, but is not fully described, nor is it named by the State Entomologist of Indiana in his 1910 report, p. 226.

THE NYMPHS OF THE NORTH AMERICAN SPECIES OF
LEUCORRHINIA.

BY E. M. WALKER, TORONTO.

Through the kindness of Mr. F. C. Whitehouse, of Red Deer, Alta., who has been actively collecting and studying the Odonate fauna of this locality during the past two years, I have recently obtained nymph exuviae of *Leucorrhinia borealis* Hagen and *L. proxima* Calvert, the only two North American species of this genus, whose nymphs have not yet been described. Recently-emerged imagines of both species, as well as of *L. hudsonica* were found by Mr. Whitehouse, accompanied by their exuviae, so that in addition to the finding of the two new nymphs he has been able to furnish the information necessary to prove that the nymph described by me as that of *hudsonica** was correctly referred to this species.

The nymphs of *Leucorrhinia* may be characterized as follows:—Head somewhat less than twice as broad as long, eyes most prominent behind the middle, lateral margins very oblique, curving into the posterior margin without any indication of an angle. Mentum of labium about as broad as long, mental setae usually 13-15, inner margins of lateral lobes with very low crenulations, the marginal spinules in groups of two or three, of which one is much the longest, sometimes single; movable hood slender, scarcely half as long as the free margin of the lateral lobe; lateral setae 10 or 11. Abdomen ovate in outline, broader than the head, broadest at segment 6, tapering almost equally cephalad and caudad; lateral spines present only on segments 8 and 9, those on 9 not extending beyond apices of abdominal appendages; dorsal hooks present or absent, but never on segment 9; superior appendage triangular, acuminate, distinctly longer than broad, but little shorter than the inferior appendages; lateral appendages about half as long as the inferiors.

I have been able to find no good characters for the separation of nymphs of *Leucorrhinia* and *Sympetrum*. Generally speaking, the superior abdominal appendage is somewhat more elongate and acuminate in *Leucorrhinia*, being considerably longer than the basal breadth and not much shorter than the inferior appendages.

* Can. Ent., 1914, vol. XLVI, p. 375, pl. XXV, figs. 9-12.

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In *Sympetrum* it is usually but little longer than broad, and falls considerably short of the inferior appendages even when the appendages are closed together. The head in *Sympetrum* is relatively somewhat larger, as a rule, than in *Leucorrhinia*.

Leucorrhinia hudsonica and *L. borealis* are distinguishable from all the known nymphs of *Sympetrum* except *S. rubicundulum*, *S. illotum* and *S. corruptum* by the absence of dorsal hooks on segs. 7 and 8. They are readily separated from these by the much larger lateral spines and the conspicuously striped venter of the abdomen. The other species of *Leucorrhinia* are distinguished from *Sympetrum* by the presence of a small dorsal hook on seg. 3, which, however, is very minute in *L. proxima*.

In offering the following key I am well aware that it may prove unsatisfactory in certain respects. The nymphs of *Leucorrhinia* and *Sympetrum* are variable in the very characters which are most useful in separating them. Those of *L. intacta*, *glacialis* and *proxima* are extremely similar and as I have had only a single exuvia of *glacialis* and but two of *proxima* it is quite uncertain whether or not the characters given will prove to be constant when more material is available for study.

KEY TO THE NYMPHS OF THE NORTH AMERICAN SPECIES OF
LEUCORRHINIA. 3

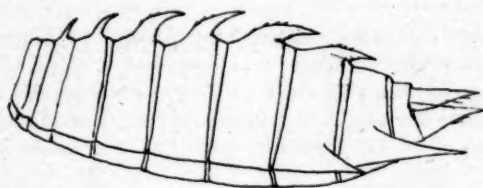
- A. Dorsal hooks present on abd. segs. ~~7~~ 8, venter of abdomen without longitudinal dark bands.
 - B. Eyes very prominent; lateral spines of seg. 9 extending back nearly or quite as far as tips of inferior appendages.....*frigida* Hag.
 - BB. Eyes less prominent, lateral spines of seg. 9 not extending back as far as tips of inferior appendages.
 - C. Dorsal hook of seg. 7 as long as mid-dorsal length of the segment, that of seg. 8 projecting well over the base of seg. 9; lateral spines of seg. 8 more or less divergent, their outer margins not continuing the regular curve of the abdominal margin; lateral spines of seg. 9 extending beyond tips of lateral appendages.
 - D. Spinules on inner margin of lateral lobes of labium mostly in groups of 3; lateral setæ 10; dorsal hook

- of seg. 8 not declined, directed straight caudad at apex.....*intacta* Hag.
- DD. Spinules on inner margin of lateral lobes of labium mostly single; lateral setae 11; dorsal of seg. 8 generally somewhat declined, the tip sometimes resting on dorsum of seg 9*.....*glacialis* Hag.
- CC. Dorsal hook of seg. 7 shorter than the mid-dorsal length of the segment, that of seg. 8 projecting barely over the base of seg. 9, lateral spines of seg. 8 slightly convergent, their outer margins continuing the general curve of the abdominal margin; lateral spines of seg. 9 not reaching beyond tips of lateral appendages.....*proxima* Calvert.
- AA. Abdominal segs. 7 and 8 without dorsal hooks, venter of abdomen with 3 conspicuous longitudinal dark bands (rarely inconspicuous).
- E. Length less than 18 mm.; lateral spines of seg. 8 two-fifths to one-half as long as the lateral margin of the segment (not including spine); dorsal hooks absent or vestigial ones present on some of the segments.....*hudsonica* Selys.
- EE. Length more than 18 mm.; lateral spines of seg. 8 one-sixth to one-fourth as long as the lateral margin of the segment; dorsal hooks absent.....*borealis* Hag.

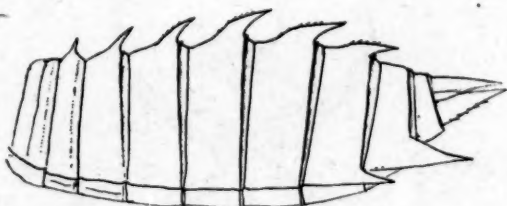
***Leucorrhinia borealis* Hagen.**

Nymph.—Eyes less prominent than in the other North American species of *Leucorrhinia*, the width of the head across the eyes being somewhat less than twice the length (not including labium); postero-lateral surfaces broadly rounded with numerous coarse hairs. Mentum of labium of the usual size and form, being subtriangular, nearly as broad as long; the median lobe rather bluntly obtusangulate; lateral lobes with inner margins feebly and broadly crenated, the marginal spines short, single, or with a second vestigial spinule; posterior margin with a few short scattered spinules or almost devoid of these; mental setae 13, occasionally 14, the third

*Vide Needham, Bull, 47, N. Y. State Mus., p. 519, 1901.



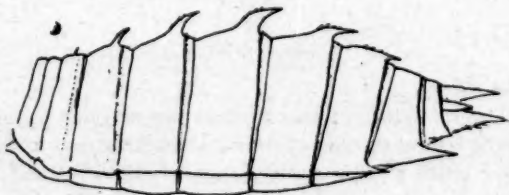
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4

NYMPHS OF LEUCORRHINIA.

to sixth from the outside longest; lateral setae 11, sometimes 10. Abdomen somewhat elongate ovate, broadest at seg. 6, or at apical margin of seg. 5, tapering almost equally proximad and distad, its lateral margins forming an almost regular arc, fringed with spinules distally, especially on segments 8 and 9. Dorsal hooks wholly

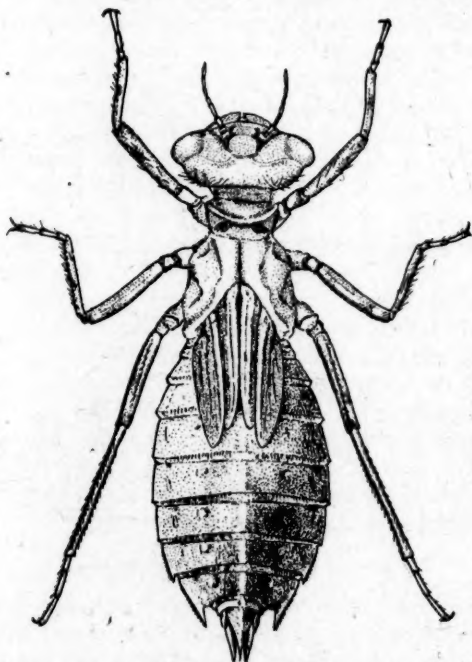
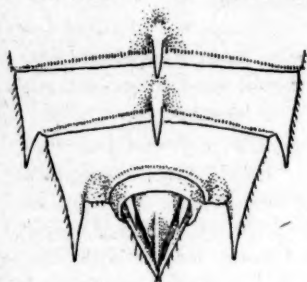
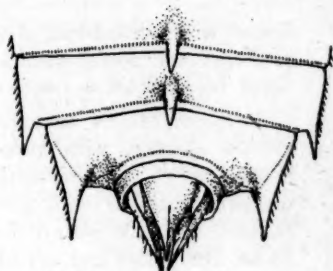


Fig. 20.—*Leucorrhinia borealis*, Hag., nymph.

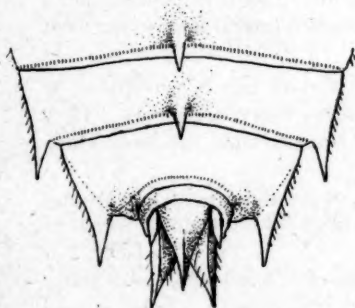
absent. Lateral spines of seg. 8 about one-seventh to one-fourth as long as the lateral margins of the same segment (not including the spine) their inner margins nearly parallel; those of seg. 9 about two-fifths the length of the lateral margin of the segment, not reaching apices of lateral appendages, their inner margins slightly convergent. Superior appendage triangular, keeled and somewhat



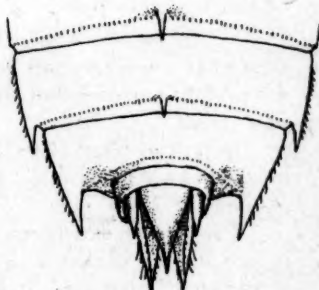
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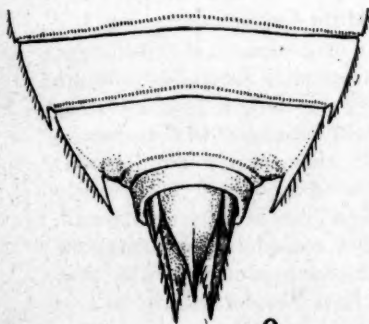
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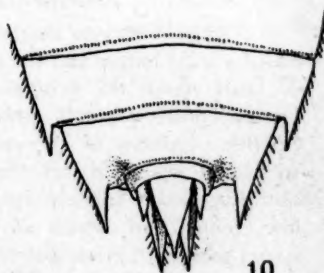
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10

NYPHS OF LEUCORRHINIA

spinulose on distal half above, about twice as long as lateral appendages and reaching back nearly to tips of inferior appendage; basal breadth about three-quarters of the length.

Colour pattern (exuvia)—Dull brownish more or less distinctly marked with paler yellowish. Head dark, sometimes streaked with pale yellowish behind and beneath the eyes; thorax obscurely mottled; wing-pads with more or less distinct pale costal streaks; legs pale with darker annuli as follows: femora with sub-basal, anteapical and apical, tibiae with basal, median and apical annuli, tarsal joints darkened distally. These markings are often largely obscure, the anteapical femoral rings being the most distinct and constant. Abdomen dark above with a median line, a pair of dorso-lateral spots and the postero-lateral angles on most of the segments pale.

Venter pale with three longitudinal dark bands, which may be somewhat obscure but are generally heavy and conspicuous. They are usually narrower but sometimes broader than the intervening pale areas.

Length of body 19.0–21.5 mm.; outer wing-pad 6.0–6.5 mm.; hind femora 5.0–5.8 mm.; width of head 5.25–5.6 mm.; width of abdomen 6.7–7.3 mm.

This nymph closely resembles that of *L. hudsonica*, particularly in the absence of dorsal hooks and the conspicuously striped venter of the abdomen. It is, however, easily distinguished from *hudsonica* by its larger size and the shorter lateral spines on segments 8 and 9.

***Leucorrhinia proxima* Calvert.**

Nymph.—Exuvia similar to that of *L. intacta*, slightly larger. Head a trifle longer and the eyes a shade more prominent. Width of head across the eyes about twice the length (not including labium) postero-lateral surfaces broadly rounded with numerous bristles. Labium of the usual form, the mentum quite similar to that of *intacta*, slightly longer than broad, middle lobe bluntly obtusangulate. Inner margins of lateral lobes with the usual broad, low crenulations, which are minutely, secondarily crenulate, the spines mostly in groups of two, of which one is much shorter than the other, a few single. Movable hook slender, nearly half as

long as inner margin of lobe. Mental setæ 11-15 (one specimen has 11 and 14, the other 13 and 15) of which the outer fourth to sixth is the longest. Lateral setæ 11 (10 on one side of one specimen). Abdomen ovate, broadest at seg. 6, tapering almost equally roxi mad and distad, the lateral margins almost regularly arcuate, fringed with spinules which become gradually stronger caudad. Lateral spines of seg. 8 about two-fifths as long as the margin of the segment, their outer edges continuing the regular curve of the abdominal margin, their general direction slightly convergent; those of seg. 9 about three-fifths as long as the margin of the segment, extending back to the apices of the lateral appendages, their outer margins straight and about in line with those of the segment, their general direction somewhat convergent. Superior appendage keeled above in the distal half, basal breadth about three-fourths the length, apex slender, slightly acuminate, sharp-pointed; lateral appendages about half as long as the superior; inferior appendages slightly surpassing the superior, with 4 or 5 spinules on their outer margins.

Colour pattern.—The two exuviae show nothing distinctive in coloration. They are pale with darker mottlings as in *glacialis* and *intacta*. Femora with sub-basal and anteapical annuli and darkened at apices, tibiae with basal and median annuli, also darkened at apices. Abdominal segments with a row of pale spots on each side, nearly midway between the middle line and the lateral margins. These spots are surrounded by darker cloudings and behind each is a dark spot. They are obsolescent in front of seg. 6. Laterad of these are irregular dark annuli with pale centres, and at the lateral margins of most of the segments the darker colour occupies the anterior half of the segment. Lateral spines pale, tipped with dark brown.

Length of body 19-20 mm.; outer wing-pad 6 mm.; hind femora 5.8-6.0 mm.; width of head 5 mm.; width of abdomen 7 mm.

EXPLANATION OF PLATES XII AND XIII.

Plate XII—Nymphs of *Leucorrhinia*, left lateral views of abdomen.

Fig. 1.—*L. frigida*.

Fig. 2.—*L. intacta*.

Fig. 3.—*L. glacialis*.

Fig. 4.—*L. proxima*.

Plate XIII—Nymphs of Leucorrhinia, terminal segments of abdomen, dorsal view.

Fig. 5.—*L. frigida*.

Fig. 8.—*L. proxima*.

Fig. 6.—*L. intacta*.

Fig. 9.—*L. borealis*.

Fig. 7.—*L. glacialis*.

Fig. 10.—*L. hudsonica*.

NEW SPECIES OF NEW ENGLAND SARCOPHAGIDÆ.

BY R. R. PARKER, BOZENMAN, MONT.

(Continued from page 364.)

Sarcophaga scoparia nearctica, n. subsp.

Type.—Massachusetts Agricultural College, male and female.

Paratypes.—Collection of author, two males, one female.

♂.—Posterior trochanter without "brush," with long hairs only; femur usually arched, posterior face without ventral row of

bristles; tibia more or less curved, with an anterior and a posterior beard, latter much the stronger; middle coxa, at least dorsally, with more than a single row of bristles; tibia on about distal half with short, weak, anterior and posterior beards; ventral surface of anterior coxa clothed completely with bristles; anterior postsutural dorsocentrals weak but at least as long as those before the suture, only last two pairs strong; vestiture of third ventral plate erect and not short; both genital segments usually dull orange but first may be in part or wholly grayish pollinose; first segment in profile with a slight

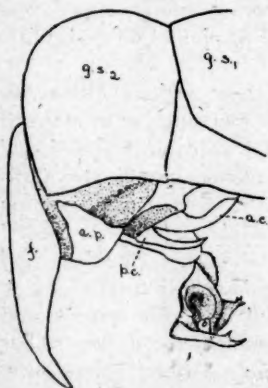


Fig. 21.—*Sarcophaga scoparia nearctica*, n. subsp., genital segments of male.

depression just anterior to marginal bristles, latter usually weak and often hair-like.

♀.—Vestiture of metanotum of short, reclinate bristles or of short nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout or at least anteriorly; anterior post-

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College.
December, 1916

sutural dorsocentrals weak but at least as long as those before the suture, only last two pairs strong; nota of abdomen clothed with short, reclinate bristles above, beneath with more erect hairs or bristles; genital segments *protuberant*, somewhat cone-shaped, visible from above; the two broad lateral lips of the first genital segment dull orange, sometimes slightly darkened, spiracles close to anterior margins; fifth and sixth ventral plates fused; sixth fully exposed, not overlapped by lips of first segment, narrowed posteriorly, its posterior margin with bristles on each side of centre.

Length.—8.5 to 15 mm., average 12 to 14 mm.

♂.—HEAD.—Viewed from side, parafrontals and genæ with dark reflections. Breadth of front varies from slightly less to slightly greater than one-half eye width; cheek height approximately one-third or three-sevenths that of eye. Front prominent, sides of frontal vitta parallel or slightly convergent backward. Second antennal segment dark; third about twice length of second; arista plumose to beyond middle. Back of head somewhat convex, usually with four, sometimes three, irregular rows of black cilia behind eyes, otherwise clothed with whitish or yellowish hair that completely covers the metacephalon except that occasionally there are black hairs in lower anterior corners. Cheeks clothed with black hair. Gena with short row of long, sometimes bristly hairs near lower eye orbit, other shorter ones may continue upward. Palpi dark.

Chaetotaxy.—Lateral verticals absent, rarely weakly developed; vibrissæ inserted slightly above mouth margin.

THORAX.—Metanotum clothed with slender, reclinate bristles or with bristle-like hair. Hairs covering anterior spiracle dark brown basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover dark brown or brownish, tips yellowish. Epaulets dark.

WINGS.—Bend of fourth vein either an acute, right, or slightly obtuse angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa about one and one-half times section V or even longer; posterior margin of alulae either bare or fringed with hair; calypters whitish, fringe of hairs dark at fold, otherwise whitish.

LEGS.—Dark. Posterior trochanter without "brush;" femur

cylindrical or somewhat spindle shaped, often more or less arched, clothed beneath with long, fine hairs that become longer and coarser posteriorly, forming a sort of beard; anterior face with three rows of bristles, those of intermediate row shortest, and not developed distally; posterior face without ventral row of bristles; tibia more or less curved; anterior and posterior faces each with a beard of long, coarse, black hairs on about distal three-fourths, latter much the stronger: tarsus usually somewhat shorter than tibia, fourth segment at least one-half fifth. Middle coxa at least dorsally, with more than a single row of bristles, though the additional bristles may be rather slender: femur clothed beneath on posterior proximal half or more with long hairs; anterior ventral row of short, scattered bristles complete, posterior row represented only by "comb" extending proximally to the long hair: submesotibial bristle present, often obscured by coarse vestiture that covers tibia ventrally on distal half or thereabouts and becomes beard-like anteriorly and posteriorly. Ventral surface of anterior coxa clothed completely with bristles which are often separable into three irregular rows, one at each side and one intermediate that is usually less complete: vestiture of tibia longest ventrally, posteriorly and distally.

Chaetotaxy.—Anterior dorsocentrals short and usually stout but longer than vestiture of præscutum; acrostichals absent or but slightly differentiated anteriorly; inner presuturals short and slender: last two pairs of postsutural dorsocentrals strong, anterior to these several weak pairs that vary greatly in length; prescutellar acrostichals present: scutellar apicals present: three sternopleurals lower sternopleura with a single row of bristles, otherwise clothed with long hairs which, in large specimens, become quite coarse.

ABDOMEN.—Somewhat conical or oval; clothed above with short, reclinate bristles, beneath with longer, more erect hair. Ventral plates, as a whole, with their sides converging posteriorly, their shape and size variable; vestiture decreasing in length posteriorly, that of third plate shortest and erect. Posterior margin at fourth notum, especially dorsally, may be dull orange.

Chaetotaxy.—Second segment without marginal bristles; third with two and usually with slender, decumbent ones between these

and laterals; fourth with a complete row ending ventrally in long hairs.

GENITAL SEGMENTS.—Prominent, usually the greater part of first exposed; ground colour dull orange or yellowish; first (g. s. 1) sometimes brownish, usually with pollen, sometimes partly grayish pollinose and occasionally entirely so except lateral posterior portions. First (g. s. 1), vestiture shorter than that of second, "humps" almost bare, in profile with a slight depression anterior to marginal bristles, latter rarely strong, usually hair-like or even so weak as to be scarcely distinguishable. Membrane joining first and second segments dorsally often blackish. Second (g. s. 2), rotund, not flattened, anal area rather small and not extending above middle of posterior surface. Forceps (♀) darkened, usually blackish, at least distally, hairy to beyond middle; base with upward flap-like extensions clothed with fine hair shorter than vestiture of second segment; tips of prongs spread and bent forward. (a. p.—accessory plate, a. c.—anterior claspers, p. c.—posterior claspers.)

GENITALIA.—Distinctive for North American species.

♀.—Females differ from males in the following important characters.

HEAD.—Breadth of front at narrowest part slightly less than eye width. Upper inner orbits of eyes diverging downward.

THORAX.—Vestiture of metanotum of short reclinate bristles or nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout, or at least anteriorly.

LEGS.—Posterior trochanter with slender apical bristle: femur somewhat spindle-shaped, not arched, bristles of intermediate row on anterior face restricted to proximal half and sometimes only a few present; posterior row with ventral row of long, well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete, but bristles weak and inconspicuous distally: submesotibial bristle very strong, sometimes a short bristle just above it.

Chaetotaxy.—Lower sternopleura with bristles only, or at most but a few long hairs anteriorly.

ABDOMEN.—Oval; vestiture short throughout, clothed above with reclinate bristles, beneath either with more erect hair or bristles.

GENITAL SEGMENTS.—Protuberant, visible from above. The two broad lateral lips of first genital segment distinctly separate dorsally; dull orange, sometimes slightly darkened, occasionally yellowish pollinose ventrally; upper edges fringed with hair and bristles, latter mostly above lines of spiracles which are close to anterior margin. Spiracles of fifth segment usually concealed. Sixth ventral plate (seventh anatomical) with posterior marginal bristles at each side of centre and not overlapped by lips of first genital notum.

Described from 3 male and 2 female specimens, many others examined.

RANGE.—New England: Mass.: Woods Hole, Boston, Lowell, Cohasset, Gloucester, Cambridge, New Bedford, Wellesley, Melrose, Chester, Amherst; Me.: E. Eddington, Orr's Island, Buckfield; Conn.: New Haven.

United States.—N. Y., N. H., Pa., Ohio, Ill., Wy.

Böttcher (1912) has shown that *S. scoparia* Pandelle should more properly be called *Sarcophaga matertera* Rondani. *S. scoparia nearctica* is one of the most variable flies of this group with which we have to deal in New England; the description gives ample evidence. The characters of the penis are as much so as the external characters. In the figure of the genitalia a lateral distal process may be noted ending anteriorly in two sharp projections. Sometimes the lower projection is lacking while in other specimens the two processes are united anteriorly, forming a sort of distal ring.

Among my material are one female and two male specimens of the Palearctic species, *S. scoparia*. These differ considerably from the American subspecies. The genital segments and genitalia are black or blackish, the bristles of the thorax are longer and more slender, and its vestiture more hairy. Some of our specimens approach the European as regards chaetotaxy and vestiture, but I have seen none with any tendency toward black genital segments, though the first is sometimes brownish. It is possible that our North American subspecies might justifiably be designated as a species.

The females of *S. scoparia nearctica* are rather difficult to distinguish from those of *S. utilis* Aldrich.

Specimens of this subspecies captured by Metz larviposited on dung and refuse. A female received from Richardson (N. J.) was captured on cow manure.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

ANNUAL MEETING.

The fifty-third Annual Meeting of the Entomological Society of Ontario was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 2nd and 3rd, 1916. The President of the Society, Mr. A. F. Winn, Westmount, P. Q., occupied the chair. The following were present at the meeting: Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington, D. C.; Prof. P. J. Parrott, Geneva, N. Y.; Prof. E. M. Walker, University of Toronto; Prof. W. Lochhead, Macdonald College, P. Q.; Prof. W. H. Brittain, Truro, N. S.; Dr. C. Gordon Hewitt, Messrs. A. Gibson and J. M. Swaine, Entomological Branch, Ottawa; Messrs. W. H. Harrington and F. W. L. Sladen, Ottawa; Rev. Father Leopold, La Trappe, P. Q.; Mr. F. J. A. Morris, Peterborough; Mr. J. Dunlop, Woodstock; Prof. J. Dearness, London; Mr. W. A. Ross, Vineland Station; Mr. W. E. Biggar, Hamilton; Mr. N. Criddle, Treesbank, Man.; Mr. A. B. Baird, Fredericton, N. B.; Professors C. A. Zavitz, J. E. Howitt, C. J. S. Bethune, L. Caesar, J. W. Crow, D. H. Jones, E. J. Zavitz, and S. B. McCready, Dr. R. E. Stone, Capt. G. J. Spencer, Messrs. A. W. Baker, A. H. Tomlinson, G. H. Unwin, C. R. Klinck, H. R. Fry, G. F. Kingsmill, E. Hearle, A. W. Guild, R. M. Aiton, J. B. McCurry and W. Evans, Ontario Agricultural College.

Letters expressing regret at their inability to attend the meeting, and containing hearty good wishes for its success, were received from the Minister and Deputy Minister of Agriculture for Ontario, the Minister of Education, and a large number of the leading entomologists in the United States.

On Thursday morning a meeting of the Council was held, at which the report of the proceedings during the past year was

drawn up and various matters relating to the Society's welfare were discussed. A recommendation was made that Mr. John D. Evans, of Trenton, a past President of the Society and a most useful adherent for many years, should be elected a Life Member. This was subsequently done at the general meeting. It was decided that the next annual meeting be held at Macdonald College, Que. The President proposed that information regarding the principal collections of insects in Canada, both public and private, should be procured and published in the *Canadian Entomologist* from time to time.

In the afternoon the members met in the Entomological Lecture Room in the Biological Building, and the proceedings commenced with the presentation of the reports of the Council and the various officers and branches of the Society, followed by the reading of papers and the election of officers, a list of whom is given below.

The open meeting was held on Thursday evening in the auditorium of the Massey Hall, and the Society was particularly fortunate in having, as lecturer for the occasion, Dr. L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture. The subject of the lecture, "The Carriage of Diseases by Insects," is one with which Dr. Howard has been closely identified for many years, and was greatly enjoyed by the large audience, among which, besides the members of the Society, were many members of the staff and students of the College and of the Macdonald Institute. The lecture was copiously illustrated by many fine lantern slides.

The Society was welcomed to the College by Prof. Zavitz in the absence of President Creelman, and at the close of the lecture a hearty vote of thanks, proposed by Dr. Hewitt and seconded by Prof. Lochhead, was tendered to Dr. Howard for his interesting and instructive address, and for his kindness in coming so far to attend the meeting.

After the lecture the members were entertained at a smoker given in the students' parlour, Main Building, a students' vocal quartette contributing much to the enjoyment of those present. Mr. Eric Hearle, a graduate of the College, who recently returned from active service in France, gave an interesting account of the

problems arising from the prevalence of Pediculi and other insect vermin in the trenches, and the means taken to alleviate the terrible suffering caused by these pests.

The following papers were read at the morning and afternoon meetings:—

"The Naturalist in the City," by the Rev. Dr. T. W. Fyles; "Dusting Fruit-trees and Grapes for the Control of Biting Insects and Diseases," by Prof. L. Caesar; "General Notes on Aphids which occur on Apple-trees," by Mr. W. A. Ross; "Further Experiments with the Green Apple Bug," by Prof. W. H. Brittain; "Notes on *Physonota unipuncta*, the Sun-flower Tortoise-beetle," by Mr. A. F. Winn; "Preliminary Notes on the use of repellants for Horn-flies and Stable-flies on Cattle," by Mr. A. W. Baker; "The Wood of Desire," by Mr. F. J. A. Morris; "Insects as Material for Studies in Heredity," by Prof. W. Lochhead; "The Migratory Tendency in Dragonflies," by Prof. E. M. Walker; "The History of the Forest Tent-caterpillar and Fall Web-worm in North America," by Mr. A. B. Baird; "Three important Greenhouse Pests recently introduced into Canada," by Mr. A. Gibson; "Camp Hygiene," by Capt. G. J. Spencer; "Experiments in the Control of the Apple Maggot," by Prof. W. H. Brittain; "Summary of Experiments on the Control of Locusts by *Coccobacillus acridorum d'Herelle*," by Messrs. E. M. Du Porte and J. Vanderleck; "Three Shade-tree Insects," by Mr. J. M. Swaine; "Notes on Some Insects of the Season," by L. Caesar; and "Parasites of the Larch Saw-fly," by Dr. C. Gordon Hewitt. These papers will be published in full in the forthcoming Annual Report of the Society.

The election of officers for the ensuing year resulted as follows:

President.—Mr. Albert F. Winn, Westmount, Que.

Vice-President.—Prof. Lawson Caesar, Dept. of Entomology, Ontario Agricultural College, Guelph.

Secretary-Treasurer.—Mr. A. W. Baker, B. S. A., Lecturer in Entomology, O. A. College, Guelph.

Curator.—Mr. W. Evans, O. A. College, Guelph.

Librarian.—Rev. Prof. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Professor of Entomology and Zoology, O. A. College, Guelph.

Directors.—Division No. 1, Mr. Arthur Gibson, Entomological Branch, Dept. of Agriculture, Ottawa; Division No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Dr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. F. J. A. Morris, Peterborough; Division No. 5, Mr. J. W. Noble, Essex, Ont.; Division No. 6, Mr. W. A. Ross, Vineland Station, Ont.

Delegate to the Royal Society of Canada.—Mr. F. J. A. Morris, Peterborough, Ont.

By kind permission of the College authorities the members were provided with lunch each day in the new Dining Hall; this proved a great saving of time, and also an agreeable opportunity for social intercourse.

DR. L. O. HOWARD.

To Dr. L. O. Howard, Chief of the Bureau of Entomology at Washington, we offer our hearty congratulations on his election to membership in the National Academy of Sciences of the United States. This is regarded as the highest honour that can be bestowed on any scientific man in North America. As stated by Mr. E. A. Schwarz in a recent issue of the Proceedings of the Entomological Society of Washington, this honour has been well earned by Dr. Howard. "He has done a good deal of meritorious work in systematic and bionomic entomology; he has published many important works on economic entomology, but above all, he is now, and has for many years been the efficient chief and leader of the Bureau of Entomology, and as such has acquired a world-wide and deserved reputation. Under the enlightened and liberal administration of Dr. Howard, the growth of the Bureau of Entomology has been really marvellous. It has become a model for the many similar, though much smaller, institutions that have been established of late years in many countries."

"Since the organization of the Academy the following entomologists have been elected members: Dr. John L. Leconte, Dr. A. S. Packard, Mr. Samuel H. Scudder, Prof. W. M. Wheeler in 1912, and now Dr. Howard." The three former are no longer living, and entomology is thus represented by the two latter only.

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